

## ENCLOSURE 1

Response Tracking Number: 00329-00-00

RAI: 2.2.1.1.7-4-008

**RAI Volume 2, Chapter 2.1.1.7, Fourth Set, Number 8:** Provide the calculations of values for BEAR 14 Tables 1 and 2 which are documented in LS-DYNA Kinematic Damaged Area Analysis for the TAD bearing Waste Package, Rev. 0, dated February 27, 2007.

### 1. RESPONSE

On April 20, 2009 during the clarification call with the NRC, it was agreed that the DOE would not provide the data files (DTN: LL0704PA048SPC.023) supporting *Mechanical Assessment of Degraded Waste Packages and Drip Shields Subject to Vibratory Ground Motion*, (SNL 2007) as part of this RAI response. The methodology used to generate these data files is described in SNL (2007), which was previously provided to the NRC.

The peak axial impact velocities provided in NNPP-SNF-YMSA-14, *Postclosure Structural Assessment (U)*, Revision O, Background, Evaluation, and Analysis Report (BEAR) 14, Table 1, were developed as follows. The data files (DTN: LL0704PA048SPC.023) supporting SNL (2007) identify the peak axial impact velocities for the three central waste packages of an 11 waste package/drift simulation subject to 68 postclosure seismic events. For each seismic event, the axial impact values are contained in a file titled *dt3DXXvYY\_EI\_summary*, where the XX is the seismic realization number (i.e., 1 – 17), YY indicates the peak ground velocity (PGV) level (i.e., 040, 105, 244, and 407 which corresponds to 0.4, 1.05, 2.44 and 4.07 m/sec, respectively), and EI is an annotation for end impacts (i.e., waste package-to-waste package). NNPP identified, by inspection of these data files, the maximum axial impact velocity of a waste package for each of the 68 seismic events and these maximum values are listed in BEAR 14, Table 1.

A comprehensive description of the methodology used to calculate the peak lateral accelerations of the waste package internals listed in BEAR 14, Table 2 is provided in TWR #A02316 (Reference (9) of BEAR 14, Revision Original), Pages 1-17, which is attached to this response. The accelerations of waste package internals are calculated following the procedure documented in SNL (2007), Section 6.3.3.1. This procedure is used to quantify the cumulative damage to a waste package outer corrosion barrier in the TSPA.

The data files (DTN: LL0704PA048SPC.023) supporting SNL (2007) identify the peak lateral impact velocities for the three central waste packages of an 11 waste package/drift simulation subject to 68 postclosure seismic events. For each seismic event, the lateral impact values are contained in a file titled *dt3DXXvYY\_PI\_summary*, where the XX is the seismic realization number (i.e., 1 – 17), YY indicates the PGV level (i.e., 040, 105, 244 and 407 which corresponds to 0.4, 1.05, 2.44 and 4.07 m/sec, respectively), and PI is an annotation for pallet impacts (i.e., waste package-to-pallet). For each waste package-to-pallet impact, the impact parameters (i.e., velocity, angle and location) and results from detailed waste package-to-pallet analyses in SNL (2007) were used by the NNPP to calculate reduced impact velocities that account for the additional energy dissipation not represented in the original kinematic analyses. Next, the reduced impact velocities and the detailed analysis results in SNL (2007) are used to quantify the accelerations of the waste package internals. The NNPP reported the maximum of the waste package internal lateral accelerations in BEAR 14, Table 2 for the 68 seismic events.

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**2. COMMITMENTS TO NRC**

None.

**3. DESCRIPTION OF PROPOSED LA CHANGE**

None.

**4. REFERENCES**

Bettis Atomic Power Laboratory 2008. *Technical Work Record Peak Accelerations From Package Impacts*. No. A02316, pages 1-17. February 14, 2008. ACC: ALA.20080501.2209.

SNL (Sandia National Laboratories) 2007. *Mechanical Assessment of Degraded Waste Packages and Drip Shields Subject to Vibratory Ground Motion*. MDL-WIS-AC-000001 REV 00. Las Vegas, Nevada: Sandia National Laboratories. ACC: DOC.20070917.0006.